

EXPLANATION OF PLATE XVI.

- FIG. 1.—*Anthracomya minima* (Ludwig), Hind. Right valve. Natural size, 10 by 5 mm.—Fig. 2, magnified.
 ,, 3.—*A. minima* (Ludwig), Hind. Right valve. Natural size, 13 by 8 mm.—Fig. 4, magnified.
 ,, 5.—*A. lævis*, Dawson. Variety. Left valve, magnified. Natural size, 8 by 6 mm.
 ,, 6.—*A. lævis*, Dawson. Right valve. Natural size, 7 by 5 mm.—Fig. 7, magnified.
 ,, 8.—*Posidonomya subovata*, sp. nov. Left valve. Natural size, 7 by 5 mm.—Fig. 9, magnified.
 ,, 10.—*P. subovata*, nov. Right valve, magnified. Natural size, 8 by 6 mm.
 ,, 11.—*P. subovata*, nov. Left valve. Natural size, $4\frac{1}{2}$ by 3 mm.—Fig. 12, magnified.
 ,, 13.—*P. subovata*, nov. Left valve. Natural size (of Fig. 15), 6 by $4\frac{1}{2}$ mm.
 ,, 14.—*P. subovata*, nov. Left valve, showing the interior; magnified. Natural size, $8\frac{1}{3}$ by 6 mm. This is not the magnified view of Fig. 13.
 ,, 15.—*P. subovata*, nov. Magnified view of Fig. 13.
 ,, 16.—*Anthracomya Valenciensis*, Etheridge. Left valve. Natural size, 7 by 7 mm.—Fig. 17, magnified.
 ,, 18.—*Posidonomya concinna*, nov. Fragment. Size of the original shell, 20 by 18 mm.

The enlarged figures are magnified about three times.

II.—PRELIMINARY NOTE ON SOME RECENTLY DISCOVERED EXTINCT VERTEBRATES FROM EGYPT. (PART II.)

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MAMMALIA (*continued*).

Eotherium ægyptiacum, Owen.

IN the lower beds remains of a Sirenian are very common, and several more or less complete skulls associated with some portions of the skeleton were found. The skull in most respects resembles that of *Halitherium*. The snout is strongly deflected and bears a pair of downwardly directed incisor tusks. There are about seven cheek-teeth, resembling in pattern those of *Halitherium*. The roof of the skull between the temporal fossæ is flat. A cast of the brain-case has been made, and in most respects it resembles that described by Owen¹ as the type of *Eotherium ægyptiacum*, from the Mokattam of Cairo. Since this seems to have come from nearly the same horizon as our specimens, I believe that there is the highest probability that they are referable to this same species, in spite of some differences between the shape of the natural cast described by Owen and that artificially made from one of our specimens.

The mandible has a sharply deflected symphysis, which is much thickened below, and it appears that teeth occurred along nearly its whole length. The vertebræ, scapula, and os innominatum are almost exactly as in *Halitherium*. It is, in fact, very remarkable that in a form so old as this (possibly Mid-Eocene, see below) there is no trace of a more generalized structure than in the later *Halitherium*, and we are apparently no nearer the primitive mammalian stock from which the Sirenians sprang.

¹ Quart. Journ. Geol. Soc., vol. xxxi (1875), p. 100.

Zeuglodon Osiris, Dames.¹

Zeuglodon remains are not uncommon, and we obtained many vertebræ, a fine mandible, and a large part of two skulls, from one of which it will be possible to get a cast of the brain-case. There are two forms, a large and a small, as described by Dames. The smaller is certainly the *Zeuglodon Osiris* of that author, who considers that the differences between the larger and smaller species are merely sexual. Of this there seems to be much doubt, but for the present, until further information is available, it will be convenient to accept this view.

REPTILIA.

The reptilian remains collected were very numerous and include some forms of great interest. In many cases the bones were in a wonderfully perfect state of preservation and had been almost completely freed from the matrix. Some of the more important new forms only will be noticed here; these include two species of snakes, three Chelonians, and a Crocodilian.

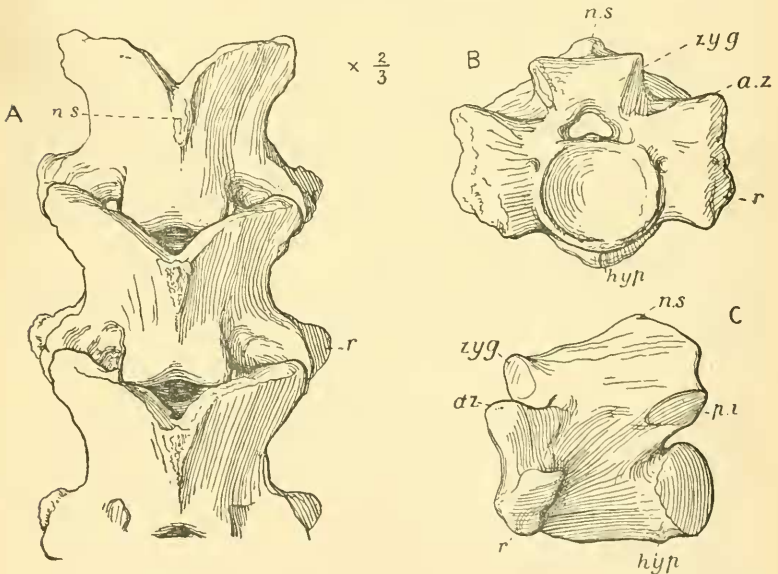


FIG. 1.—Vertebrae of *Gigantophis*. Two-thirds natural size. (A) Three articulated vertebrae from above; (B) vertebra from front; (C) vertebra from side. a.z. anterior zygapophysis; hyp. hypapophysis; n.s. neural spine; p.z. posterior zygapophysis; r. articular facet for rib; zyg. zygosphene.

Ophidia.

The fossil remains of snakes are, as a rule, very rare, but in the lower beds in which our collections were made Ophidian vertebræ

¹ Palaeont. Abhand., neue Folge, Bd. i (1894), p. 189.

were very common. They belong to two types, one an extremely large *Python*-like form, and the other a smaller, though still large snake, the chief characteristic of which is the great height of the neural spines. These two types are briefly described below.

Gigantophis Garstini, gen. et sp. nov. (Fig. 1.)

The large vertebræ of this species occur very commonly in the lower beds associated with remains of *Mæriotherium*, Zeuglodonts, and Sirenians. In one case a series of about twenty vertebræ were found in their natural relations to one another and beautifully weathered out of the matrix by the action of sand-drift (Fig. 1A).

The form of these vertebræ (Fig. 1) approaches most nearly to that seen in *Python*, to which genus it seems probable that this species was nearly related. The articular region of a mandible lends support to this view.

In the vertebræ the anterior cup of the centrum is transversely oval, and the corresponding posterior convexity is similar in shape and looks somewhat upwards. The neural spine (*n.s.*) is short and stout, and has a flat truncated extremity; the neural canal is relatively much smaller than in the recent type, but has the same somewhat trilobate form. The articular surfaces of the anterior zygapophyses (*a.z.*) are slightly above the level of the floor of the neural canal. The form of the zygosphene (*zyg.*) and zygantrum are as in *Python*. The transverse processes form massive protuberances, bearing on their outer ends articular surfaces (*r.*) for the ribs, and are of similar form to those seen in *Python*. The hypapophysis (*hyp.*) in most of the vertebræ is small, and consists mainly of a small tuberosity near the hinder end of the centrum.

These vertebræ are all of large size, much larger than in any existing Ophidian. If the proportions of this snake were the same as in the existing *Python sebæ* it probably reached a length of about 30 feet.

The dimensions of one of these vertebræ are as follows:—

	mm.
Greatest height (from top of neural spine to end of hypapophysis) ...	57·5
Greatest width (between the ends of the transverse processes) ...	63
Width of zygosphene	29
Width of articular cup of centrum	22
Height of articular cup of centrum	19
Width of articular ball of centrum	23
Extreme length of centrum	40
Width of neural canal	(approx.) 12

To this form the generic name *Gigantophis*, referring to its large size, may be given, the specific name being *Gigantophis Garstini*, in honour of Sir William Garstin, K.C.M.G., the Under Secretary of State for Public Works in Egypt.

Mæriophis Schweinfurthi, gen. et sp. nov. (Fig. 2.)

Perhaps the commonest fossils in the lower beds are the vertebræ of a large snake, which in the main points agree with those upon which Owen founded the genus *Palæophis*. Owen's specimens are

from the Eocene (Lower and Middle) of Sheppey and Bracklesham, and it is very interesting to find a similar form occurring in the Lower Tertiary deposits of Egypt. Some shells which occur associated with these remains have lately been described by Cossmann¹ from almost the same locality; they are referred by him to the Middle Eocene (Nummulitic), so probably it may turn out that the beds in which *Mæritherium*, *Bradytherium*, and the reptiles described in this paper are found, are somewhat older than stated in Part I, and are in fact Middle Eocene. This question will no doubt be settled by Mr. Beadnell in the section relating to the stratigraphy of the district.

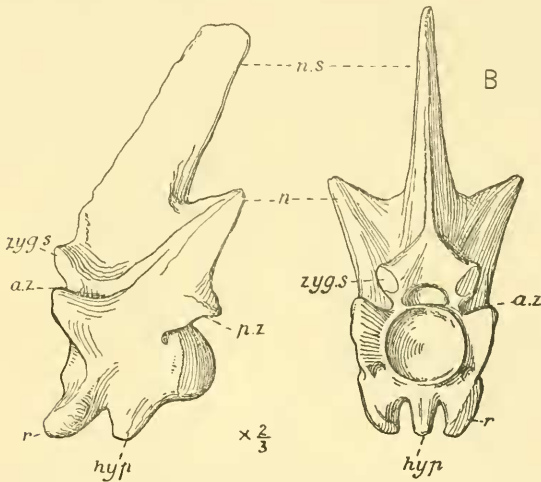


FIG. 2.—Vertebra of *Mæriophis*. Two-thirds natural size. (A) From side; (B) from front. *a.z.* anterior zygapophysis; *hyp.* hypapophysis; *n.* process on back of neural arch; *n.s.* neural spine; *p.z.* posterior zygapophysis; *r.* facet for rib; *z yg.s.* zygosphene.

The chief characteristic of these vertebræ is the great height of the neural spine (Fig. 2, *n.s.*), and with this seems to be correlated the relative narrowness of the centrum in proportion to its length and the ventral and downwardly directed position of the transverse processes (*r.*). All these characters occur to a less degree in *Palæophis*. Another point of similarity is the presence on either side of the posterior part of the neural arch of a large backwardly and upwardly projecting process (Fig. 2, *n.*), from the tip of which a ridge runs downward and forward to the base of the anterior zygapophysis. This process is more developed here than in *Palæophis*, to which, according to Owen, it is almost peculiar, only a trace being found in other Ophidian vertebræ.

The transverse processes project downward below the level of the centrum, and their lower ends may even be slightly bent in

¹ Cossmann: "Additions à la Faune Nummulitique d'Égypte" (Institut Égyptien, Cairo, 1901).

towards the middle line. The hypapophysis (*hyp.*) consists of two processes, one near the middle of the centrum, the other close to its anterior border; the latter, together with the transverse processes, is strongly inclined forward.

The whole form of the vertebra seems to me to indicate that the body was deep and laterally compressed, as in some water-snakes, and to point strongly to the conclusion that this animal was aquatic in its habits. Its association with the remains of Zeuglodonts, Sirenians, and marine turtles seems to support this.

This snake is no doubt a close ally of *Palæophis*, and must be referred to the same family; but the greater height and narrowness of the vertebræ, the more ventral position of the transverse processes, and of their surfaces for articulation with the ribs (*r.*), as well as several points in the structure of the neural arch and its articulations, justify the generic separation of this type. I propose for it the name *Mæriophis*, referring to the locality in which it was found, and its specific name will be *M. Schweinfurthi*, after Dr. G. Schweinfurth, who has done so much to add to our knowledge of Egypt in so many directions, and who seems to have been the first to collect vertebrate remains in the Fayûm.

The dimensions of one of these vertebræ are as follows:—

	mm.
Greatest height (from top of neural spine to end of hypapophysis) ...	85
Greatest width (between ends of transverse processes)	25
Width of zygosphene	19
Width of articular cup of centrum	16
Height of articular cup of centrum	14
Extreme length of centrum	31
Width of neural canal	7

Chelonia.

Chelonian remains are fairly common in the lower beds in which *Mæritherium* and *Gigantophis* occur, and some nearly complete skulls and carapaces were collected. The latter are not in very good condition for the determination of their characters, being, as a rule, traversed in all directions by cracks and coated with gypsum, so that the sutures cannot be clearly made out.

The Chelonians collected include representatives of the three chief groups, viz., the *Athecæ*, *Pleurodira*, and *Cryptodira*.

Psephophorus eocæus, sp. nov.

The *Athecæ* are represented by a humerus and possibly some masses of scutes.

The humerus (Fig. 3) differs widely from that of all land and fresh-water tortoises and of all the marine turtles, except *Sphargis*. In fact, it belongs to the most specialized type of swimming humerus found among the pelagic Chelonia (*parathalassic type* of Wieland, Am. Journ. Sci., ser. iv, vol. ix, 1900, p. 420). Among the forms of Athecate Chelonia of which the humerus is known, the present species (Fig. 3) seems to approach most nearly to *Psephophorus*, the chief points of difference being that the ulnar crest (*a*) is more

prominent and rises farther above the head (*b*), and the form of the proximal portion of the radial process (*c*) is different in several respects. For the present, until further remains are collected, it will be best to refer this form to *Psephophorus*. The specific name will be *P. eocænus*.

DIMENSIONS OF HUMERUS.

Total length	190 mm.
Width of shaft immediately below radial process	42 „
Width of head	40 „

Thalassochelys libyca, sp. nov.

Another Chelonian, represented in the collection by several more or less crushed skulls, is a Cryptodiran with roofed temporal fossæ, apparently closely allied to *Chelone*. In two cases the skulls are greatly crushed from above downward, giving them a quite misleading appearance of being low and flattened, but another specimen, including the back of the skull as far forward as the epipterygoid (columella), is quite uncrushed, and is here referred to.

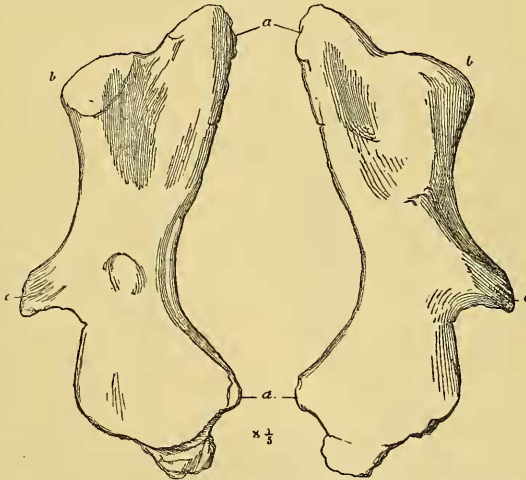


FIG. 3.—Dorsal and ventral views of left humerus of *Psephophorus eocænus*, Andrews. One-fifth natural size. (*a*) Ulnar crest; (*b*) head; (*c*) radial crest; (*d*) entocondyle.

The form of the tympanic ring, which is incomplete posteriorly, resembles that seen in *Chelone*, showing that this species is not a Pleurodiran. The presence of the columella shows that it is not one of the Athecate group, as from the occurrence of the humerus above described seemed not impossible. The roofing of the temporal fossa, as far as can be seen, is the same as in the Chelonidæ, and it may be referred provisionally to that family. The occipital condyle is trilobate, the basi-occipital extending up to the foramen magnum. The basi-sphenoidal platform is much less prominent than in *Chelone*, and there is no deep fossa beneath its hinder border as in that genus.

In this region the skull resembles that of *Thalassochelys* very nearly. There are some differences, however, the most notable of which being the greater length of the quadrate in the fossil. Nevertheless, I prefer at present to refer this species provisionally to *Thalassochelys*, with the specific name *T. libyca*.

Stereogenys Cromeri, gen. et sp. nov.

The most interesting of the Chelonian remains are several more or less complete skulls of a Pleurodiran tortoise, which presents a number of peculiar features. The Pleurodiran nature of this species is shown by (1) the completeness of the quadrate ring for the tympanum; (2) the form of the articular surface of the quadrate.

The temporal fossa is roofed as in *Podocnemis* alone among living Pleurodira. In the Mesozoic *Rhinochelys* also the temporal fossa is roofed in, but in quite a different manner from that occurring in *Podocnemis* and our fossil. So far as I can determine, this species approaches *Podocnemis* more nearly than any other Chelonian, but on the other hand there are some very important differences. The most important of these are found in the structure of the palate (Fig. 4A),

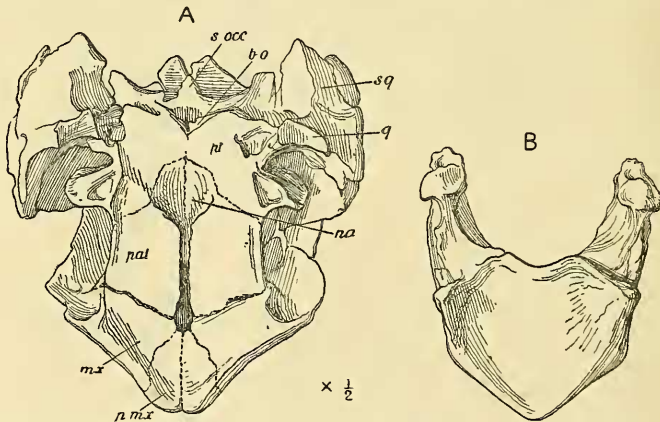


FIG. 4.—Skull and mandible of *Stereogenys Cromeri*. One-half natural size. (A) Palatal surface of skull; (B) upper surface of mandible. The premaxillæ are restored from another specimen. *b.o.* basi-occipital; *mx.* maxilla; *na.* internal nares; *p.mx.* premaxillæ; *pal.* palatines; *pt.* pterygoids; *q.* quadrate; *s.occ.* supra-occipital; *sq.* squamosal.

in which the palatine bones (*pal.*) are much longer than in *Podocnemis*, and are produced inward towards the middle line, where in some specimens they seem to have united in a median suture, in others to have remained separated by a narrow cleft, which in life was no doubt closed by membrane, so that in either case the opening of the internal nares (*na.*) was carried far back to the level of the ectopterygoid wings. This arrangement of the palatines seems to be unique among Chelonia. There is a small anterior vacuity between the hinder ends of the palatal portions of the premaxillæ (*p.mx.*) and the maxillæ (*mx.*). The pterygoids (*pt.*)

are short and broad, and have a very small extension on the palate compared to that seen in *Podocnemis*, and they seem to have been nearly excluded from the middle line by the backward prolongation of the palatines.

Four or five more or less complete skulls of this type were collected, and it will be possible from them to give a detailed account of the cranial characters.

The symphysis of the mandible (Fig. 4B) is very long, and the symphyseal region forms a broad pentagonal plate, the two anterior sides of which form the labial borders, while the two lateral bear the high pointed coronoid processes. The posterior side is slightly concave. The dorsal surface of the symphyseal surface was probably covered by a strong horny plate, which, judging from the large size and anterior position of the coronoid process and the depth of the muscle impressions, must have formed a powerful crushing apparatus. The backward position of the internal nares seems to be correlated with the existence of this arrangement, the union of the palatines extending just far enough backwards to bring the opening behind the level of the symphysis. Probably the anterior part of the palate in front of the narial opening was also covered with a horny plate.

To this new form I propose to apply the generic name *Stereogenys*, the species being called *S. Cromeri*, after the Earl of Cromer, the British Agent and Consul-General at Cairo.

The dimensions of the figured skull and mandible are:—

SKULL.						
Extreme length as figured	...	...	...	...	...	96 mm.
Extreme width ¹	...	...	...	...	...	98 "
Width between ends of ectopterygoid wings	...	...	...	...	...	65 "
Width between outer ends of articular surface of quadrates	...	...	...	...	...	74 "
Width of articular surface of quadrate	...	...	...	...	...	14 "
MANDIBLE.						
Total length	...	...	...	...	...	71 mm.
Length of symphysis	...	...	...	...	...	45 "
Width at coronoid	...	...	...	...	...	55 "
Width at articulation for quadrate	...	...	...	...	...	64 "

Several carapaces and plastra were collected which probably belong to this form. Their Pleurodiran character is shown by the fusion of the lower ends of the pubes and ischia with the plastron. As a rule the mode of preservation is such that it is extremely difficult to make out the position of the sutures, even in specimens otherwise in excellent preservation. In one plastron, however, it seems fairly clear that there were small lateral mesoplastrals and that a large intergular plate was present.

Crocodilia.

Tomistoma africanum, sp. nov.

Remains of Crocodylians are very common in the lower beds in some localities, and in some cases attain a very large size. Vertebrae and scutes, either isolated or in groups, most commonly occur, but occasionally a large part of the skeleton was seen. When

¹ This specimen is somewhat crushed, so that the width is slightly exaggerated.

the material is fully examined it is probable that two or three species will be found. At present it will only be necessary to mention one, to which the finest specimens collected are referable. These include an almost perfect mandible and the anterior portion (about 34 cm. in length) of a snout, with the upper and lower jaws in their natural positions with regard to one another.

In the mandible the symphysis is very long and Gavial-like, but in this region there are only 14 teeth on each side, the total number in each ramus being 19–20. The splenial enters largely into the formation of the symphysis. The first and second teeth are large, the third smaller, the fourth large again, then the remainder somewhat smaller, and of nearly the same size throughout except a few of the hindermost.

There are four premaxillary teeth, of which the second and third are the largest; the fourth is small, and behind it there is a diastema into which the large fourth lower tooth bites. Only the first four of the maxillary teeth are preserved. The teeth are nearly circular in section. The premaxillary region is very slightly flattened and expanded, and the nasal opening is heart-shaped, with the point directed backwards: the relations of the premaxillaries and nasals to it cannot be made out, none of the sutures being visible.

Comparison of this Crocodile with other types shows that without doubt it is referable to the genus *Tomistoma*, the only living species of which occurs in the rivers of the Malay Peninsula, Borneo, and the neighbouring islands, while fossil representatives, or very closely allied types, occur in the Miocene of Malta and Eggenburg.

This species differs from the recent form in the slightly greater expansion of the premaxillary region and the somewhat greater length and slenderness of the articular process of the mandible. Apart from these and some other peculiarities, the difference in the horizon and locality of this form entitles it to specific distinctness; it may be called *Tomistoma africanum*.

The dimensions of the mandible are:—

Total length	cm.
Length of symphysis	103
Width of jaw at symphysis	49·5
Width of articular surface for quadrate	11·2
Depth of ramus at symphysis (approx.)	6·8
	4·2

In another specimen of the front of the snout the premaxillary expansion is nearly 8 cm. wide, while the somewhat contracted region immediately behind the premaxillary teeth is only 5 cm. in width.

PISCES.

Fish remains were collected in considerable quantity, but have not yet been examined in detail; they seem to be mostly portions of the skeleton of large Siluroids, but remains of a Saw-fish (? *Propristis Schweinfurthi*, Dames) are not uncommon, one complete rostrum being obtained.